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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/608,856	06/30/2000	Jin Yang	42390. P8533.	2493

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EXAMINER

BRODA, SAMUEL

ART UNIT PAPER NUMBER

2123

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/608,856

**Applicant(s)**

YANG, JIN

**Examiner**

Samuel Broda

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15, 20-24 and 29-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 20-24, and 29-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 June 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date see enclosure.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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### DETAILED ACTION

1. This communication is in response to Applicant's Official Amendment and Response (the "Amendment") mailed on 27 May 2004. In the Amendment, claims 10, 20, and 30 were amended; claims 16-19 and 25-28 were canceled; claims 31-38 were added.

Claims 1-15, 20-24, and 29-38 have been examined.

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### *Election/Restriction*

2. In the Amendment at page 13 paragraph 2, Applicant "respectfully acknowledges the requirement for restriction and indicates an election of the following group of claims" and Applicant also states at page 12 paragraph 5 that:

The remaining comments are directed to the restriction requirement under 35 USC 121 and to the added Claims 31-38. Applicant respectfully notes that in the Office communication mailed on April 28, 2004, interpretations or characterizations by the Examiner include references and/or potential limitations to which Applicant does not wholly agree. Therefore, Applicant reserves future rights to dispute any portion or all of said interpretations or characterizations.

Because Applicant has not included in the Amendment any reasons for the disagreement with the restriction requirement, Applicant's response is considered an election without traverse. See 37 CFR 1.143 and MPEP §§ 818.03-818.03(a).

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***Information Disclosure Statement***

3. Each of the following Information Disclosure Statements by Applicant ("IDS") has been considered. A signed copy of each IDS having the following mailing dates should be included with this Office action:

1. 3 May 2002;
2. 7 May 2003;
3. 8 March 2004; and
4. 19 July 2004.

***Drawings***

4. Applicant's formal drawings have been reviewed and approved by the PTO Draftsperson.

***Claim Rejections - 35 U.S.C. § 112, First Paragraph***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5.1 Claims 20-24 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling.

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5.2 Regarding claims 20 and 22, these claims are subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph as reciting only a single (means) limitation. See MPEP § 2164.08(a).

5.3 Claims 21 and 23-24 are rejected based on their dependency to a rejected claim.

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***Claim Rejections - 35 U.S.C. § 112, Second Paragraph***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6.1 Claims 1-15, 20-24, and 29-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 1-15, 20-24, and 29-38 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps or elements, such omission amounting to a gap between the steps or elements. See MPEP § 2172.01. Independent claim 1 is directed to a computer software product; independent claims 10 and 35 are directed to a method; independent claims 20, 29, and 32 are directed to a verification system.

Each independent claim includes a limitation to strengthening one or more antecedent labels. For example, independent claim 1 states:

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A computer software product including one or more recordable media having executable instructions stored thereon which, when executed by a processing device to:  
strengthen a first antecedent label for an edge in assertion graph.

These independent claims fail to include the essential matter corresponding to steps, elements, or necessary structural cooperative relationships of elements described by Applicant as necessary to practice the invention. In particular, the Specification at page 18 lines 22-23 states that "In order to indicate normal satisfiability, a method is needed to propagate future antecedents backwards." Pages 18-20 of the Specification describe the necessary strengthening method steps illustrated at Fig. 3b using pre-image sets.

**6.2** All dependent claims inherent this defect, with the exception of dependent claims 3, 11, and 21 that appear to describe the steps necessary to strengthen one or more antecedent labels.

***Claim Rejections - 35 U.S.C. § 101***

**7.** The following is a quotation of 35 U.S.C. 101:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

**7.1** Method claims 10-15 and 35-38 are rejected for reciting a process comprising an abstract idea.

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7.2 Regarding claim 10, this claim is directed to “a method comprising: strengthening a first antecedent label for an edge in an assertion graph.” This step does not: (1) recite data gathering limitations or post-mathematical operations that might independently limit the claims beyond the performance of a mathematical operation; or (2) produce a practical application having a useful, concrete, and tangible result.

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7.3 Regarding claim 35, this claim is directed to a method for verifying a justification property. The recited steps do not: (1) recite data gathering limitations or post-mathematical operations that might independently limit the claims beyond the performance of a mathematical operation; or (2) produce a practical application having a useful, concrete, and tangible result.

The claimed invention is not useful since the method of claims 10-15 and the method of claims 35-38 do not recite a result that is useful in the technological arts. This makes it difficult to determine Applicant’s invention since it merely claims a manipulation of abstract ideas.

The claimed invention is not concrete because the results are not assured. For example, is a solution possible for any and all arbitrary inputs?

The claimed invention is not tangible since, for example, the results of strengthening an antecedent label or verifying the justification property are undefined.

7.4 Claims 11-15 are dependent on claim 10 and rejected using the same analysis. Claims 36-38 are dependent on claim 35 and rejected using the same analysis.

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***Claim Rejections - 35 U.S.C. § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the date of invention thereof by the applicant for patent.

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8.1 Claims 1-2, 10, 20, and 29 are rejected under 35 U.S.C. 102(a) as being anticipated by Sipma et al, “Deductive Model Checking,” Formal Methods in System Design, Volume 15, pp. 49-74 (1999) (text available at <http://www-step.stanford.edu/papers/fmsd99.pdf>).

8.2 Regarding claims 1-2, Sipma teaches a set of transformations for strongly connected subgraphs (see download pages 1-18) and further teaches a method of strengthening a strongly connected subgraph and determining reachability. According to Sipma at Section 4.6 download page 18 paragraph 4: “To check if a strengthened node is reachable, backward propagation through the graph to reach an initial state can be carried out, using the weakest precondition operator.”

The backward propagation operation using the weakest precondition operator corresponds to Applicant’s method steps in claims 1-2 because the backward propagation method taught by Sipma corresponds to the abstraction of a second antecedent label into a first label and the strengthening of the label for an edge in an assertion graph.



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**8.3** Regarding claims 10, 20 and 29, these are the corresponding method and system claims and are rejected using the analysis of claims 1-2 above.

***Indication of Allowable Subject Matter***

**9.** Subject to the rejections listed above, and based on the prior art located to date and made of record, claims 3-9, 11-15, 21-24, and 30-38 do not appear to be taught or rendered obvious.

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***Conclusion***

**10.** The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure. Reference to Aagaard et al, "Formal Verification Using Parametric Representation of Boolean Constraints," Proceedings of the 36<sup>th</sup> ACM/IEEE Conference on Design Automation, pp. 402-407 (June 1999), is cited as teaching the encoding of data-space constraints used to decompose verifications by sets of case splits and to restrict verifications by validity conditions.

Reference to Aagaard et al, "Combining Theorem Proving and Trajectory Evaluation in an Industrial Environment," Proceedings of the Design Automation Conference, pp. 538-541 (June 1998), is cited as teaching the verification of an instruction-length marker using the combination of symbolic trajectory evaluation and lightweight theorem proving.

**11.** Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Samuel Broda, whose current telephone number is (703) 305-

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1026. This telephone number will be changed to (571) 272-3709 effective 1 October 2004. The Examiner can normally be reached on Mondays through Fridays from 8:00 AM – 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, currently can be reached at (703) 305-9704. This telephone number will be changed to (571) 272-3716 effective 1 October 2004. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.



**SAMUEL BRODA, ESQ.**  
**PRIMARY EXAMINER**